

## 1 Claims

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3 1. Method for the automatic starting and stopping of an  
4 internal combustion engine (1) of a motor vehicle by means of a  
5 start-stop device (20), by means of which the internal  
6 combustion engine (1), having been started by a person, is  
7 switched off automatically depending on multiple stop  
8 conditions, wherein one of the stop conditions is the release  
9 of the stop mode of an air-conditioning device (10) depending  
10 among other things on a temperature ( $T_{ist}$ ) prevailing in the  
11 interior (9) of the motor vehicle and a further stop condition  
12 is the expiration of a defined variable time period,  
13 characterized in that the time period ( $\Delta t$ ) depends on the  
14 temperature difference ( $\Delta T$ ) between the temperature  
15 ( $T_{ist}$ ) prevailing in the interior (9) and the target  
16 temperature ( $T_{soll}$ ) desired by the driver.

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18 2. Method according to claim 1, characterized in that the  
19 time period ( $\Delta t$ ) depends on the air-conditioning  
20 performance of the air-conditioning device (10).

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22 3. Method according to claim 2, characterized in that the  
23 time period ( $\Delta t$ ) depends on a relative air-conditioning  
24 performance ( $P_{klima\_rel}$ ), wherein this relative air-  
25 conditioning performance ( $P_{klima\_rel}$ ) is the quotient of the  
26 air-conditioning performance of the air-conditioning device  
27 (10) and the temperature difference ( $\Delta T$ ).

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29 4. Method according to claim 3, characterized in that  
30 the end of the time period ( $\Delta t$ ) depends on a basic value  
31 (GW) of a threshold value (SW), wherein this basic value (GW)  
32 is read out from an engine characteristics map depending on the  
33 relative air-conditioning performance ( $P_{klima\_rel}$ ).

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2 5. Method according to claim 3, characterized in that the  
3 threshold value (SW) is calculated from a link between the  
4 basic value (GW) and a learning factor (L1), wherein the  
5 learning factor (L1) represents a driver-specific manner of  
6 driving.

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8 6. Method according to claim 1, characterized in that, where  
9 an air conditioning request is made by the driver and the  
10 internal combustion engine (1) is not running, this air  
11 conditioning request starts a timer (T1) that sets a start time  
12 of the time period (delta\_t), and the end of the time period  
13 (delta\_t) is determined by a comparison of the current value of  
14 the timer (T1) with the threshold value (SW), whose value is  
15 dependent on the temperature difference (delta\_T).

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17 7. Method according to claim 6, characterized in that the  
18 starting of the timer (T1) sets a logic marker (M1).

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20 8. Method according to claim 7, characterized in that, where an  
21 air conditioning request is made by the driver and the internal  
22 combustion engine (1) is running, the value of the timer (T1)  
23 is compared incrementally with the threshold value (SW), and  
24 where the threshold value (SW) is exceeded by the current value  
25 of the timer (T1), release of the stop mode of the air-  
26 conditioning device is enabled.

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28 9. Method according to any one of the preceding claims,  
29 characterized in that the temperature (T<sub>ist</sub>) of the interior  
30 is measured or calculated according to a temperature model.

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32 10. Method according to claim 9, characterized in that a  
33 physical/mathematical temperature model of the vehicle interior

1 is used to calculate the interior temperature ( $T_{ist}$ ), said  
2 model taking into account a plurality of variables which  
3 represent the inflow and the outflow of heat energy under  
4 different operating conditions of the vehicle.

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6 11. Method according to claim 10, characterized in that the  
7 variables of the temperature model include the geometry and the  
8 size of the vehicle interior, its thermal insulation  
9 properties, the surface area of the windows, the number and  
10 electrical output of activated electrical consumers located in  
11 the vehicle interior and the input of heat through solar  
12 irradiation and through an interior heating and ventilation  
13 device.

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15 12. Method according to any one of the preceding claims,  
16 characterized in that multiple interior-zone-related target  
17 temperatures ( $T_{soll}$ ) and interior temperatures ( $T_{ist}$ ) are  
18 determined and taken into account.

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20 13. Method according to any one of the preceding claims,  
21 characterized in that this method controls in an analogous  
22 manner an air-conditioning-related restart of the internal  
23 combustion engine.

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